Space Weather Forecast

Issued on Thursday, 04 January 2024 at 01:17 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Further Moderate flares likely with a slight chance of isolated Strong flares.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Activity has been low with largest flare being a Common-Class flare from a complex region in the northeast. This continues to be the main region of note with a complex magnetic configuration and a weak delta spot contained in its largest spot. There are four sunspot regions now on the disc, but the remaining spots are all smaller and simpler at this time.

A number of coronal mass ejections (CMEs) were visible in imagery, however these have all been assessed as being off the Earth-Sun line with no Earth-directed CMEs occurring.

Solar Wind / Geomagnetic: Solar winds were indicative of a weak fast wind from a coronal hole, followed by the arrival of two CMEs, the first from a filament eruption on 31 Dec and the second from the Strong flare that left the sun on 31 Dec. Speeds varied between 380-450km/s, before increasing to vary mostly between 450-490km/s after the second CME arrival at 03/1420UTC, but did peak briefly at 501 km/s at 1900UTC. The Interplanetary Magnetic Field (IMF) varied between weak and moderate levels, but increased to peak at more persistently moderate levels, following the second CME arrival. The north-south component, Bz varied weakly between northward and southward directions at first, but reached moderately positive levels briefly, following the first CME arrival, then varies weakly again for the rest of the period. Geomagnetic activity was Quiet to Unsettled (Kp1-3).

Energetic Particles / Solar Radiation: Count rate of energetic particles (high energy protons) has been on an increasing trend, with observed values just above the S1/Minor Storm threshold at time of issue.

Four-Day Space Weather Forecast Summary

Solar Activity: Despite the low flare activity over the past 24 hours, there remains a likelihood of further isolated Moderate flares from the complex region in the northeast and a slight chance of a strong flare.

Solar Wind / Geomagnetic Activity: Despite two CMEs giving glancing blows on the 03 Jan, minimal geomagnetic effects were observed. Otherwise, fast winds from CH86/-, with current speeds of 450-480km/s are expected to continue at first Day 1 (04 Jan), gradually easing later in the day. Wind speeds are then expected to continue to ease towards background levels through Days 1-2 (05-06 Jan). No other enhancements are forecast. Quiet geomagnetic activity is expected for much of the period, with a decreasing chance of isolated Unsettled intervals.

Energetic Particles / Solar Radiation: Count rate of energetic particles (high energy protons) has risen just above the S1/Minor Storm threshold in response to recent significant flare activity. S1 storm levels are expected to continue on Day 1 (04 Jan), with a chance of continuing into Day 2 (05 Jan), then a slight chance on subsequent days, dependent on any further notable flares occurring.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	1	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	55	55	55	55
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	Yes	100	25	10	15
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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